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Economic and social aspects of tree planting in British Columbia: A survey of workers and contractors

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Abstract

This study reports social and economic information on planting contracts and on workers employed to plant trees in British Columbia. This data was derived from a survey jointly undertaken in 1985 by the British Columbia Ministry of Forests and Lands and the Canadian Forestry Service. Experience, skill, education, income, and other characteristics of the work force are presented for several categories of workers and supervisory staff in the silvicultural industry. The geographical origin of the work force is examined, and costs to contractors of wages and other expenses are compared.

Résumé

Cette étude renferme des renseignements d'ordre social et économique sur les contrats de plantation et sur les ouvriers qui plantent des arbres en Colombie-Britannique. Les données ont été réunies dans le cadre d'une étude que le ministère provincial des Forêts et des Terres et le Service canadien des forêts ont fait en 1985. L'experience, les connaissances, les études, le revenu et d'autres caractéristiques de la main-d'oeuvre sont décrits pour plusieurs catégories d'ouvriers et de superviseurs dans l'industrie de la sylviculture. On y examine également l'origine géographique de la main-d'oeuvre et l'on y compare le coût des salaires et les autres frais des entrepreneurs.

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We would like to acknowledge the assistance and support of Dirk Brinkman and other members of the executive of the Western Silviculture Contractors Association, Robin Brown and Bill Williams of the British Columbia Ministry of Forests and Lands, and Jack Rudd of the Canadian Forestry Service who was responsible for most of the computer work performed.

Introduction

Planting, in concert with other silvicultural activities in British Columbia, has expanded dramatically in recent years. Over the 10-year period 1974 to 1984, planting levels more than doubled from 54 million trees to over 121 million trees. An ambitious expansion program is underway which will lead to annual planting levels of at least 200 million trees in the near future. Associated activities such as nurseries and site preparation and so on will all increase in parallel.

Virtually all planting in the province and most other silviculture work is performed by private contractors. In effect, there is a large and growing silvicultural labor force employed in the private sector of the British Columbia economy. However, there is very little information on the actual amount or type of employment generated. Even less information is available on the labor force itself, and little is known about where the individuals come from or to what extent they rely on silviculture for their employment and income. Other information on education, skill levels and other basic socioeconomic information is almost entirely lacking. This is unfortunate, because during periods of high unemployment such as experienced in British Columbia over the last several years, the ability of silviculture activities to generate productive short-term employment is an important element in program rationale.

This report partially fills this information gap on the silviculture industry by providing data on planting contracts and on workers employed to plant trees in British Columbia. The data were derived from a survey jointly undertaken in 1985 by the Canadian Forestry Service and the British Columbia Ministry of Forests and Lands. The report emphasizes is on the economic and social aspects of planting in order to: (i) improve the general level of knowledge and understanding of British Columbia's silvicultural contractors and workers; and (ii) provide basic economic data and information required to aid the planning and analysis of planting programs.

Survey Design and Methodology

The survey involved considerable preliminary planning effort. This was necessary because one earlier attempt by the British Columbia Ministry of Forests and Lands to survey silvicultural contractors had been unsuccessful. A number of difficulties were encountered with the earlier survey design and in obtaining cooperation from the respondents. On the basis of this prior experience, there was extensive consultation with various groups and individuals before this survey was implemented. A concerted attempt was made to obtain support for the survey and advice on the survey design and distribution procedures.

Two questionnaires were used in this employment and cost survey: a contractor questionnaire and a worker questionnaire. The contractor questionnaire, to be completed by silvicultural contractors, requested information specific to individual planting contracts. The worker questionnaire was primarily designed to obtain more personal information from the employed labor force. Although each questionnaire was intended to obtain somewhat different information, they were designed with sufficient overlap in a number of key areas to facilitate some useful cross-checking of the information received.

Organization of the survey

Preliminary questionnaire forms were developed early in 1984. These were used in discussions with the executive of the Western Silviculture Contractors Association and staff of the Silviculture Branch of the Ministry of Forests and Lands. The general response to the survey was extremely positive. Both Silviculture Branch and the Silvicultural Contractors Association recognized the potential value of the information for their own internal planning. On the basis of input received, the draft questionnaires underwent numerous and substantial revisions. Discussions in this regard, particularly with the Western Silviculture Contractors Association, focussed on the feasibility of completing the questionnaires given the general state of record keeping in the industry and contractor hiring practices. Other issues discussed included timing and means for distributing the questionnaires.

In order to test response rates and identify operational difficulties with the survey, a small preliminary test was initiated in the fall of 1984. Six contractors were selected; three were located in the interior of the province (Prince George Forest

Region) and three on the coast (Vancouver Forest Region). Each contractor was requested to select two representative contracts for analysis and complete one contractor questionnaire for each. In addition, worker questionnaires were enclosed and the contractor was requested to distribute these to a number of his employees. The results from this preliminary survey confirmed the feasibility of a larger effort. On the basis of follow-up telephone interviews, none of the contractors considered the contractor questionnaire difficult to complete. The reported average time required was approximately one-half hour. Also, the responses received to the worker questionnaire indicated no substantial problems. Therefore, a full-scale survey was launched in the spring of 1985.

Survey of workers

A package of worker questionnaires was mailed directly to each member of the Contractors Association for distribution to their work force prior to the start of the 1985 spring planting season. The intent was to have the questionnaire completed by workers at the time of hiring in conjunction with income tax and other employment related information forms. The questionnaire itself was easy to complete: it was only one page long, and most questions required a check mark rather than a written response.

The questions were designed to elicit information on various socioeconomic characteristics of the work force. Examples include education, alternative skills, work experience and degree of personal dependence on silviculture for employment and income.

In designing the questionnaire, a number of difficult trade-offs were involved between the desire for information and the desire to maintain a high response rate. For example, a question on income from Unemployment Insurance was rejected as it might be considered too personal and reduce the response rate. Also, to encourage a high response rate, complete confidentiality was emphasized. Names were not required on the questionnaire and untraceable prepaid return envelopes were provided.

Survey of contractors

The contractor questionnaire was distributed later in the planting season through the Ministry of Forests and Lands. The contractor provided the information after completion of the planting contract. Most responses were received substantially later in the year, after the planting season.

About 1000 contracts were expected during the 1985 season, and the intent was to survey a total sample of 240 contractors. In order to ensure full geographic coverage, 40 were randomly selected in each of the six forest regions throughout the province.

The contractor questionnaire was much more comprehensive than the worker questionnaire. It was assumed that contractors would have adequate records and the inclination to provide in-depth answers on their planting operations. Among other things, the questionnaire requested information on hiring practices, working arrangements and a breakdown of project costs into wages and other categories. The contractor questionnaire is also included in the appendix.

As with the worker questionnaire, confidentiality was stressed in all communications with the contractors. Although it was necessary for reasons of follow-up to retain contractor names on the questionnaires, complete confidentiality was promised. Again, to encourage response, prepaid return envelopes were provided.

Analysis

All of the completed questionnaires were returned to the Pacific Forestry Centre of the Canadian Forestry Service for analysis. The first step involved a general check of responses for internal consistency and subsequent editing to ensure the quality of the data. In the case of the contractor questionnaire, it was sometimes necessary to speak with contractors by telephone in order to clarify their responses.

Given the extensive and detailed information provided, efficient handling required computerization. After investigating several options, the VAX II Datatrieve computer software package was selected as the most appropriate tool for analysis of the information. The main advantage of

Datatrieve is a search function which facilitates the retrieval and summarization of detailed subcomponents of a data base. A program using this computer package was developed and was used in the analysis which follows.

Survey Results

Response rates and sample coverage

Packages of 100 worker questionnaires were sent to each of the 31 members of the Western Silviculture Contractors Association for distribution to their employees. Three of these packages were returned because the contractors were no longer in business. Of the remaining 2800 forms, 254 completed worker questionnaires were received. Of these, 7 were dropped from further consideration because it was not clear that the workers were involved in planting work. If all of the contractors employed at least 100 workers, the numbers received would imply a response rate of slightly over 9%. However, most contractors hire substantially less than 100 workers. For this reason, we cannot tell the actual response rate.

Based upon average productivity data and other information derived from the contractor questionnaire, we estimate that about 1,700 individuals were employed in planting during the 1985/86 fiscal year. Based on this estimate, the 247 responses represented approximately 15% of the employed labor force.

There are some clear limitations with the sampling procedure used with the worker questionnaire. Random sampling of the entire population of planting workers would have been preferable. However, for distribution purposes, it was necessary to have a prepared list of active contractors prior to the planting season. The membership list of the contractors association was the best available from this perspective. We assumed that the work force employed by members of the contractors association is typical of the silviculture industry as a whole.

Of 240 contractor questionnaires distributed, 36 completed forms were received. This implies a response rate of 15%. However, it is known that some contracts were cancelled at the last moment. As a result, the actual response rate would be somewhat above 15%. Since these questionnaires were distributed after the award of the contract, responses were received from a mixture of members and non-members of the Contractors Association.

With respect to sample coverage, 112 million trees were planted on 101000 ha of provincial Crown forest land during the 1985/86 fiscal year. The responses received account for approximately 9% of the provincial Crown planting during 1985/86, on both an area and total tree basis.

A number of factors lead us to believe that the responses represent a reasonably good, if somewhat small, sample of planting contracts in the province. First, the sample has a very satisfactory geographic range, with responses received from all of the six forest regions in the province (Table 1). Second, there was a wide distribution in the size of contracts from very small to very large. The area planted in individual contracts ranged from 5 ha to over 760 ha. Total contract payments ranged from about $1,000 to over quarter of a million dollars on individual contracts, with bid prices ranging from about 11 cents to 32 cents per tree. Table 2 outlines a number of measures of the range and average size of the contracts surveyed.

Table 1. Geographic distribution of contract sample

Forest region	Contracts	Area Planted*	Trees Planted*
		(hectares)	
Cariboo	3	913	1 791 846
Kamloops	4	464	499 350
Nelson	9	769	1 000 900
Prince George	6	1 878	2 225 875
Prince Rupert	6	1 541	2 232 931
Vancouver	8	1 539	1 329 770
Total	36	7 104	9 080 672

* Not all respondants indicated the area or number of trees planted in the contract. As a result, the total area and number of trees planted in the contract sample would be somewhat higher than indicated.

Table 2. Measures of contract size

	Responses*	Average	Range	
			Minimum	Maximum
Area Planted	29	245 ha	5 ha	763 ha
Number of Trees Planted	32	275 172 trees	6 000 trees	1 228 256 trees
Total Contract Payment	33	$55,706	$1,050	$275,605
Bid Price Per Tree	32	20.08¢	10.75¢	31.7¢

* Not all respondents answered all questions. For the purpose of averaging, all non-responses have been excluded.

Project organization and working arrangements

A number of questions in the survey related to the organization of planting contracts and the working arrangements between contractors and their employees. One area of interest was the distribution of the labor force into different operational categories such as supervisory staff, planters, cooks and other labor. A second area of interest was the degree of employer and employee organization in the industry, as reflected in union and other types of association memberships. A final area of interest was typical arrangements for the provision of accommodation and food within the industry. Since planting projects are widely distributed throughout the province, and many of them are far removed from major population centers, the provision of these basic necessities is an exceptionally important issue.

The total labor force identified by the contractors surveyed was 868 individuals. Sixty-three of these, or about 7%, were identified as supervisors while 751 or about 87% of the total labor force were identified as planters. This implies that, on average, a supervisor operationally manages about 12 planters. Cooks and helpers make up between 3% and 4% of the labor force and other labor makes up the 2% to 3% balance. Office staff and supply drivers were the main job types identified in this last category. Exactly one-third of the total labor force was female. Women were underrepresented in the supervisory category at only 14% of the total, while they represented 80% of cooks and helpers.

Only 2 out of 36 contracts were performed by union labor. However, these contracts were, on average, much larger than the typical contract (i.e. 505 ha versus an overall average of 197 ha). In terms of trees planted, work performed by union members represents about 9% of the total in the sample. In addition to actual unions, a Pacific Reforestation Workers Association exists within the industry as a voluntary membership organization. Responses to the workers questionnaire indicate that about 1 in 10 workers belong to this association. The degree of overlap between union and association membership is not known, but it is clear that the vast majority of workers within the industry are unorganized.

Contractors as a group are somewhat more organized than their employees. Eight out of the 36 contracts surveyed were undertaken by members of the Western Silviculture Contractors Association. As with contracts performed by union labor, association member contracts tend to be somewhat larger on average. In terms of trees planted, members of the contractor's association performed about 35% of the total work in the sample.

In half of the contracts reported, tent camp accommodation was used by the work force. The next most common response was a commuting arrangement from some permanent community. However, the contracts using a commuting arrangement tend to be very small (on average approximately 50 ha) and only about 5% of the trees were planted by commuting workers. In contrast, about 77% of the trees were planted by workers living in tent camps. Other accommodation types used in order of precedence were logging camps (10% of the workers), motel or hotel(4% of the workers), and one trailer camp (4% of the workers) was reported. The motel or hotel option tends to be used on relatively small contracts, while the other options tend to be used on relatively large contracts.

In the case of tent camps, employees are generally expected to provide their own tents, sleeping bags and other related equipment. Other accommodation types are usually arranged for or provided by the contractor. Cooking facilities and services are not always provided, even in tent camps. Cooks and cook shacks were only available in 14 out of the 36 contracts and these services accounted for about 54% of the trees planted. In most instances where accommodation or food is provided, the employee must pay for these services with *per diem* rates ranging between $10 and $20, with an average charge of about $14.

Recruitment of workers

Planting projects are dispersed throughout the rural areas of British Columbia and it is usually assumed that they provide employment opportunities to workers residing in these areas. The survey tested this assumption by investigating the hiring practices of contractors and identifying the permanent residence of workers. On the worker questionnaire, employees were asked to give the town or city which is their permanent residence. A series of questions were included in the contract questionnaire to determine whether contractors hired their labor force from communities near the project, or elsewhere.

All workers who responded to the worker questionnaire said their permanent residence was in Canada, and 86% cited their permanent residence as British Columbia. The remaining 14% are from across the country, with 10% having a permanent residence in Quebec or Ontario. About 85% of planters reside in British Columbia, while 94% of supervisors listed British Columbia as their residence.

Contractors were asked to specify where they recruited the workers they employed. The results here are entirely consistent with the results from the workers questionnaire discussed above. 86% percent of workers were recruited in British Columbia and 14% were recruited out of province. However, contractors indicated that only 37% of workers were recruited from areas which are local to the planting site; 49% were recruited from elsewhere in British Columbia. These results throw into question the assumption that planting generates employment only in rural areas proximate to the project site. Although most employment is created in British Columbia, there is a significant employment impact in other provinces. Within British Columbia most employment is not hired locally. hiring is done elsewhere and the labor force is then moved to the project site.

Age and education of the work force

A considerable amount of data and information was obtained concerning the education and age of workers. On the contractor questionnaire, planters, supervisors and other workers were classified by age. On the worker questionnaire, the level of education attained was queried.

Given the physically demanding nature of planting work, it is not surprising that the labor force is relatively young. More than 70% of the workers indicated that they were 30 years of age or younger (Figure 1). However, only 13% indicated that they were 20 years of age or younger. The lack of workers in this youngest category is partially explained by the timing of the planting season. Spring planting generally starts before the high school summer holidays. Consequently, only limited participation by the teenage labor force can be expected. About 28% of the labor force is between 31 and 45 years of age, and only about 1% of labor force is older than 45 years of age.

Of the respondents, 37% indicated that they were students. Of the balance, the survey results indicate a relatively high level of educational attain-

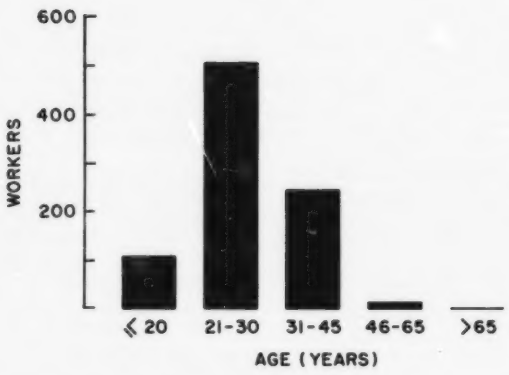

Fig. 1. Age distribution of the workforce.

ment. Fully 89% of the nonstudent workers indicated that they had attained at least high school graduation. Also, almost one in four indicated at least one university degree. In contrast, only 3% of the workers indicated attaining less than high school graduation.

Skills and experience

The skills and experience of the work force is interesting and important from a number of different perspectives. First, planting, and silvicultural work in general, is a seasonal occupation. A worker with a broad range of experience and marketable skills will be more able to take advantage of other employment opportunities and would be less dependent on silviculture alone for livelihood. Second, the experience of the work force specifically in silviculture has important implications for the nature of the work force and the type of employment created by silvicultural work. A generally inexperienced work force would reflect a transient working population which tended to treat silvicultural work as stopgap employment. On the other hand, an experienced work force would reflect a stable, more professional attitude towards silviculture work as an economic activity.

With respect to experience and skills of the workers, the worker questionnaire asked about other major occupations in which the employee had recent experience or training. The responses are summarized in Table 3 according to Statistics Canada's standard occupational categories. There is really no one dominant area in which the workers have alternative experience or training. The largest proportion (16%) indicated experience in construction trades and occupations. The specific skills noted covered the entire range of construction activity including electricians, carpenters, plumbers and laborers. The next highest proportion (14%) reported experience in the service occupations. Respondents here included cooks, waiters, child care workers, handy men, etc. The third most frequent response reflects the relatively high student participation in the work force, approximately 12% indicated experience in artistic, literary, recreational and related occupations. The majority of these responses indicated experience in outdoor and physical education in summer camps, etc.

Experience in forest industry occupations (other than silviculture) is not that common. Only 10% of the respondents indicated experience in logging or forest related processing. This is the same proportion that indicated experience in farming, horticulture or animal husbandry. The frequency of responses drops dramatically after these main categories. Other responses indicate an eclectic mix of different skills and experience.

With respect to silviculture experience, the responses to both the worker and the contractor questionnaires indicate a surprisingly stable labor force (see Table 4). The responses to the worker questionnaire indicated that less than 30% of all workers and about 33% of planters are inexperienced. At the other extreme, approximately 29% of all workers had five or more seasons of experience in silviculture; one supervisor indicated 18 seasons in the industry. Supervisors tend to be somewhat more experienced than planters; they had an average experience of seven seasons. However, the experienced planters (i.e. excluding new entrants) average 5 seasons of experience. The contractor questionnaires revealed a much smaller proportion of inexperienced workers; only about 17% of the planters were new entrants. However, the proportion of workers with three and four seasons of experience (24%) and the proportion with more than five seasons of experience are (26%) identical to the worker questionnaire responses.

Employment duration and productivity

Planting is seasonal work; it takes place in the spring and early summer months, and in the fall.

Table 3. Summary of other skills and experience of the work force, by standard occupational category

	Respondents	(%)
Construction trades and occupations	39	16
Service occupations	35	14
Artistic, literary, recreational and related	31	12
Forest industry	24	10
Farming, horticulture and animal husbandry	24	10
Product fabricating, repairing and assembling	18	7
Sales occupations	14	6
Clerical and related	13	5
Fishing, trapping and related	9	4
Occupations in medicine and health	8	3
Occupations in natural science, engineering and mathematics	7	3
Miscellaneous other occupations	29	12
Total	251	100

Table 4. Silvicultural experience of the work force

Number of Seasons	Supervisors	(%)	Planters	(%)	Total	(%)
			WORKERS			
0	0	0	72	33	72	30
1-2	3	18	38	17	41	17
3-4	2	13	53	24	55	23
5+	11	69	58	26	69	29
			CONTRACTORS			
0	1	2	130	17	131	16
1-2	2	3	251	33	253	31
3-4	14	22	178	24	192	24
5+	46	73	192	26	238	29

This seasonal pattern is a reflection of the necessity of planting when biological and climatic conditions are appropriate, and requires high productivity from workers.

To gather information on this aspect of planting, workers were asked how many weeks they worked in the previous season. Contractors were asked for information on the number of trees planted and the number of workers employed, as well as the time worked. Thus, some measures of productivity can be obtained.

Based on answers to the worker questionnaire, planters who had worked in the previous season were employed for an average of 12 weeks, with a range of 1 week to 25 weeks. Supervisors were employed for an average of 18 weeks in the previous season, with a range of 7 weeks to 40 weeks.

During the planting season, workers worked extremely long hours. The average work week is 6 days, although many respondents indicated a 7-day work week. The average work day is 9.1 hours (for planters) to 10.4 hours (for cooks and helpers), although work days of 11 or 12 hours are not unusual during the brief planting season.

Planters averaged about 870 trees per day, with a range across contracts of 600 trees per day to 1400 trees per day. Based on an average work day of 9.1 hours, this implies average of about 100 trees per hour per planter.

This information can be used to estimate total employment in planting during the planting season. For example, during the 1985/86 fiscal year, 112 million trees were planted in British Columbia. Given the productivity and other data reported above, this level of planting would generate over 20000 work weeks of employment and require a labor force of approximately 1700 people. Allowing for the short-term nature of the employment, this work effort converts to about 625 person-years of full-time employment (assuming 1,800 hours is a full work year).

Income

Respondents to the worker questionnaire were asked to give information regarding both their earnings in the previous year from silviculture work and their total income. This information allows us to measure the absolute level of income from silviculture as well as draw inferences on the importance of silviculture as a source of income.

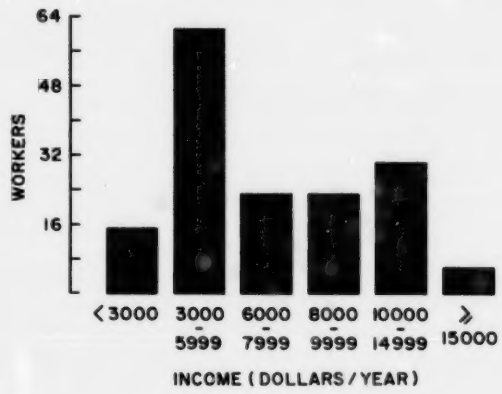

Fig. 2. Income from silviculture work by income class.

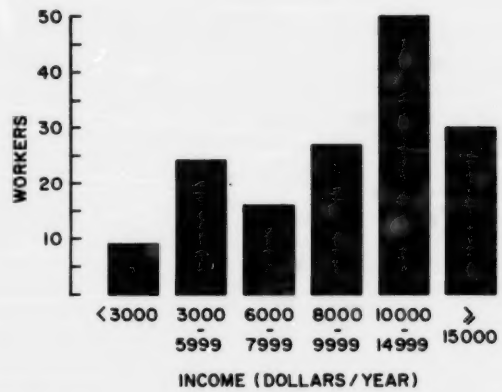

Fig. 3. Total income from all sources by income class.

Figure 2 shows income from silviculture work, by income class. Figure 3 shows total income from all sources, also by income class. Both charts exclude respondents who did not work in silviculture during the previous year.

In order to estimate average income from silviculture work and average income from all sources, some assumptions are necessary for those respondents who indicated their income

fell in the upper class. Assuming a mid-point for the upper class of $20,000, planters averaged $6,800 from silviculture work and $10,150 of income from all sources. This indicates that about 67% of all income of the planters came from silviculture work during the short season.

For supervisors, using similar assumptions, average income from silviculture work was $11,175 and total income was $15,175. This indicates that 74% of all income of supervisors came frombuted to silvicultural work.

These estimates can be somewhat misleading due to the high student participation in the work force; therefore, a number of compilations were made segregating the student and the nonstudent work force. As expected, significant differences were evident between the two groups in both income and dependance on silvicultural income.

On average, students earned somewhat less silvicultural income and substantially less in total income. The estimated average silvicultural income of students was approximately $6,300 compared to $7,700 for nonstudents. The average total income of students was about $8,500, compared to $11,700 for non-students. Not surprisingly, students are somewhat more dependant on silvicultural income; many indicated that it was their total income for the year. On average, about 74% of student income came from silviculture, compared to 65% for the nonstudent work force.

Components of project costs

A final area of interest is the breakdown of tree planting expenditures into different cost categories. The proportion of expenditures which are direct wage payments to planters, supervisors and other employed labor has clear implications for the effectiveness of tree planting in creating jobs. A high proportion of money spent on wages implies a very direct and immediate effect in terms of job creation. While expenditures on other overhead costs such as transportation, equipment and supplies also have employment implications, these effects are less direct, more diffused and generally weaker.

The contractor questionnaire investigated cost components in detail. Contractors were asked to list their total wage payments by category of worker and, if possible, give a detailed breakdown of other costs incurred in the planting operation. The quality of responses, particularly the breakdown of other costs, was relatively varied. This largely resulted from difficulty apportioning many overhead costs between different projects. The figures reported here result from a substantial edit of the data provided. As a result, the general conclusions are likely more valid than the specific figures given.

Eighteen out of 36 contracts surveyed provided sufficient information on cost breakdown for use in the following analysis. Total costs under these contracts were close to $1.1 million and approximately $812,000 or 74 cents out of every dollar was paid out as wages. Of the total wage bill, about 11% was paid to supervisors and about 5% was paid to cooks and other non-planting staff. About 84% of the total wage bill was paid to planters. More than 4 cents in every contract dollar was paid in Workers Compensation Board premiums.

The other main cost categories identified were (1) equipment and supplies, (2) camp costs, (3) transportation and (4) other overhead. On average, camp and transportation costs are about equally important, representing 30% and 34% respectively of total "other costs." "Equipment and supplies" and "other overhead" categories are somewhat less important on average, representing about 15 and 21% respectively of costs other than wages.

The average figures reported here could be somewhat misleading. There is a wide variation between contracts in the relative importance of different cost categories. In some instances, transportation or camp costs can represent a major portion of total costs, but in most instances they are a relatively small portion. Clearly, this is strongly influenced by the accessibility of the planting site and its proximity to population centers.

Summary and Conclusions

1. Planting is a relatively unorganized activity. While some contractors belong to the Western Silviculture Contractors Association and some workers are unionized or belong to the Pacific Reforestation Workers Association, no widespread form of organization was apparent.

2. In terms of accommodation, tent camps predominate. Workers either provide their own food and accommodation, or the contractor provides these and charges the workers for the service.

3. The vast majority (86%) of workers are British Columbia residents. About 37% of the workers were hired in the area local to the project; the rest were hired elsewhere in British Columbia and Canada.

4. The workers are young and educated. Over 70% of the workers are 30 years of age or younger, and 37% are students. Of the workers who are not students, 89% have graduated from high school and 23% have at least one university degree.

5. The workers are generally experienced in silviculture work. About 70% of the workers had previous silviculture experience and 52% had at least three seasons of experience.

6. The duration of employment in planting is short, with long work days and weeks common. Planters worked an average of 12 weeks during the year, about 10 hours per day and 6 days per week. An estimated 1700 planters were employed during the 1985/86 fiscal year.

7. Workers' income from planting was modest, but accounted for a significant portion of total income. Planters income from planting appears to average about $6,000 to $7,000 per year, representing about two-thirds of all income. Student workers are more dependent than nonstudent workers on income from planting.

8. Wages are the most significant element of a contractor's costs. About 75 cents of each dollar paid by a contractor is for labor services.

9. Further work in this area would be useful. In particular, similar studies of other labor-intensive silvicultural activities should be considered.